

HIRSCH et al
Serial No. 10/046,536

Atty Dkt: 4114-2
Art Unit: 2654

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Original) A speech analyzing stage for analyzing in the spectral domain a speech signal sampled at one of at least two different system sampling rates, comprising:
 - a first spectral analyzer for analyzing the speech signal up to a first frequency; and
 - a second spectral analyzer for analyzing the speech signal at least above the first frequency.
2. (Currently Amended) The speech analyzing stage according to claim 1,
wherein the first frequency is derived from ~~the~~ a lowest sampling rate.
3. (Original) The speech analyzing stage according to claim 1,
wherein the second spectral analyzer analyzes the speech signal only above the first frequency.
4. (Original) The speech analyzing stage according to claim 1,
wherein the second spectral analyzer analyzes the speech signal up to a second frequency and further comprising a third spectral analyzer for analyzing the speech signal at least above the second frequency.
5. (Currently Amended) The speech analyzing stage according to claim 4,
wherein the third spectral analyzer analyzes the speech signal only above the second frequency.
6. (Original) The speech analyzing stage according to claim 1,

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wherein the spectral analyzers are arranged in parallel.

7. (Original) The speech analyzing stage according to claim 1,
wherein at least one of the spectral analyzers is an energy analyzer.

8. (Original) The speech analyzing stage according to claim 7,
wherein at least one energy analyzer is configured as a filterbank.

9. (Original) The speech analyzing stage according to claim 1,
further comprising at least one coding unit for coding acoustic parameters of the sampled
speech signal.

10. (Original) The speech analyzing stage according to claim 9,
further comprising an interface for transmitting the coded acoustic parameters to a remote
network server.

11. (Currently Amended) A speech analyzing stage in an automatic speech recognition
system, the speech analyzing stage being utilized for analyzing in the a spectral domain a
speech signal which is sampled at one of at least two different system sampling rates and
comprising:

- a first spectral analyzer for analyzing the speech signal in a lower spectral
range up to an upper frequency limit which is derived from the a lowest system sampling
rate; and
- a second spectral analyzer for analyzing the speech signal, the second spectral
analyzer being arranged in parallel to the first spectral analyzer.

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12. (Currently Amended) A distributed speech recognition system for recognizing speech signals sampled at one of at least two different system sampling rates, the system comprising:

- a) at least one terminal with
 - a first spectral analyzer for analyzing the speech signals up to a first frequency;
 - a second spectral analyzer for analyzing the speech signal at least above the first frequency;
- b) a network server with a central speech recognition stage.

13. (Currently Amended) A data signal to be transmitted from a terminal to a network server within an automatic speech recognition system in which speech signals are sampled at two or more different system sampling rates, the data signal comprising a first data structure relating to the a sampling rate at which a speech signal has been sampled and a second data structure ~~containing~~ comprising a codebook index derived from a codebook for a specific combination of one or more acoustic parameters obtained by analyzing the speech signal up to a first frequency and one or more further acoustic parameters obtained by analyzing the speech signal at least above the first frequency.

14. (Original) A method of analyzing a speech signal sampled at one of at least two different system sampling rates utilized by an automatic speech recognition system, comprising

- a first analysis step for analyzing the speech signal up to a first frequency;
- a second analysis step for analyzing the speech signal at least above the first frequency.

15. (Original) The method according to claim 14, wherein in the second analysis step the speech signal is analyzed only above the first frequency.

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16. (Original) The method according to claim 14,
wherein in the second analysis step the speech signal is analyzed up to a second
frequency and further comprising a third analysis step for analyzing the speech signal at
least above the second frequency.

17. (Original) The method according to claim 16,
wherein in the third analysis step the speech signal is analyzed only above the second
frequency.

18. (Original) The method according to claim 14,
wherein the analysis steps for the speech signal are performed in parallel.

19. (Currently Amended) The method according to claim 14,
further comprising obtaining acoustic parameters from the analyzed speech signal, coding
the acoustic parameters, and transmitting the coded acoustic parameters to a network
server.

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20. (Original) A computer program product comprising program code portions for performing in an automatic speech recognition system the steps of:

- sampling a speech signal at one of at least two different system sampling rates;
- performing a first analysis step for analyzing the sampled speech signal up to a first frequency; and
- performing a second analysis step for analyzing the sampled speech signal at least above the first frequency.

21. (Original) The computer program product of claim 20, stored on a computer readable recording medium.

22. (New) A speech analyzing stage for analyzing in the spectral domain a speech signal sampled at a selected one of at least two different system sampling rates, comprising:

- a first spectral analyzer for analyzing, up to a first frequency, the speech signal sampled at the selected sampling rate; and
- a second spectral analyzer for analyzing, at least above the first frequency, the same speech signal sampled at the selected sampling rate.

23. (New) A speech recognition system comprising:

a speech analyzing stage for recognizing a speech signal sampled at a selected one of at least two different system sampling rates, the speech analyzing stage comprising plural spectral analyzers including:

- a first spectral analyzer for analyzing, up to a first frequency, the speech signal sampled at the selected sampling rate; and
- a second spectral analyzer for analyzing, at least above the first frequency, the same speech signal sampled at the selected sampling rate; and

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a recognition stage having a single pattern matching unit which serves the plural spectral analyzers.

24. (New) The speech recognition system of claim 23, wherein a number of the plural spectral analyzers equals a number of different system sampling rates.

25. (New) The speech recognition system of claim 23, wherein at least one of the spectral analyzers is situated in a terminal and the recognition stage is located in a remote network server.

26. (New) The speech recognition system of claim 25, wherein
the first spectral analyzer comprises:

- a first filter bank for generating L' number of acoustic parameters in a linear spectral domain;

- a first non-linear transformation unit for transforming the L' number of acoustic parameters into a logarithmic spectral domain; and

- a first Discrete Cosine Transformation unit for converting the L' number of acoustic parameters into L number acoustic parameters in a cepstral domain for feeding to the recognition stage;

the second spectral analyzer comprises:

- a second filter bank for generating M number of acoustic parameters in a linear spectral domain;

- a second non-linear transformation unit for transforming the M number of acoustic parameters into a logarithmic spectral domain;

wherein the the M number of acoustic parameters in the logarithmic spectral domain are fed to the recognition stage, thereby obviating need of a Discrete Cosine Transformation unit for the second spectral analyzer.

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